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Total No. of Questions—**21**

Total No. of Printed Pages—**2** **Regd. No.** ☐☐☐☐☐☐☐☐☐☐

Part III
PHYSICS
Paper II
(English Version)

Time : 3 Hours ***Max. Marks : 60***

SECTION A

10×2=20

***Note* :—** (*i*) Answer ALL questions.

(*ii*) Each question carries TWO marks.

(*iii*) ALL are very short answer type questions.

1. What is hypermetropia ? How can it be corrected ?

2. What is the force on a conductor of length L carrying a current '*i*' placed in a magnetic field of induction B ? When does it become maximum ?

3. A short bar magnet placed with its axis at 30° with a uniform external magnetic field of 0.25 T experiences a torque of magnitude equal to 4.5×10^{-2} J. What is the magnitude of magnetic moment of the magnet ?

4. What happens to compass needles at the Earth's poles ?

5. What is meant by wattless component of current ?

6. What is the principle of production of electromagnetic waves ?

7. Write down Einstein's photoelectric equation ?

8. The photoelectric cut-off voltage in a certain experiment is 1.5 V. What is the maximum kinetic energy of photoelectrons emitted ?

9. What happens to the width of the depletion layer in a *p*-*n* junction diode when it is :

(*i*) forward-biased and

(*ii*) reverse-biased.

10. Mention the frequency range of speech signals.

SECTION B

6×4=24

***Note* :—** (*i*) Answer any SIX of the following questions.

(*ii*) Each question carries FOUR marks.

(*iii*) ALL are short answer type questions.

11. Define critical angle. Explain total internal reflection using a neat diagram.

12. Derive the expression for the intensity at a point where interference of light occurs. Arrive at the conditions for maximum and zero intensity.

13. State Gauss's law in electrostatics and explain its importance.

14. In a parallel plate capacitor with air between the plates, each plate has an area of 6×10^{-3} m^2 and the distance between the plates is 3 mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 100 V supply, what is the charge on each plate of the capacitor ?

(Permittivity of air, $\in_0 = 8.85 \times 10^{-12}$ C^{2}N^{-1}m^{-2})

15. What are the basic components of a cyclotron ? Mention its uses.

16. Obtain an expression for the emf induced across a conductor which is moved in a uniform magnetic field which is perpendicular to the plane of motion.

17. What is impact parameter and angle of scattering ? How are they related to each other ?

18. Explain the working of LED. What are its advantages over conventional incandescent low power lamps ?

SECTION C

2×8=16

***Note* :—** (*i*) Answer any TWO of the following questions.

(*ii*) Each question carries EIGHT marks.

(*iii*) ALL are long answer type questions.

19. Explain the formation of stationary waves in an air column enclosed in open pipe. Derive the equations for the frequencies of the harmonics produced.

Two organ pipes of lengths 65 cm and 70 cm respectively, are sounded simultaneously. How many beats per second will be produced between the fundamental frequencies of the two pipes ?

(Velocity of sound = 330 m/s)

20. State the working principle of potentiometer. Explain with the help of circuit diagram how the potentiometer is used to determine the internal resistance of the given primary cell.

21. Define mass defect and binding energy. How does binding energy per nucleon vary with mass number ? What is its significance ?

Calculate the energy equivalent of 1 g of substance.